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Date: June 2, 2017
To: All North Carolina Clinicians
From: Zack Moore, MD, MPH, State Epidemiologist
Subject: Annual Update on Surveillance for Lyme disease in North Carolina (2 pages)

**Introduction**

Lyme disease (LD) is caused by infection with the bacterium *Borrelia burgdorferi* sensu stricto transmitted by the bite of an infected *Ixodes scapularis* tick, commonly known as the deer tick or black legged tick. The North Carolina Division of Public Health (DPH) encourages clinicians to consider the possibility of LD when assessing patients with clinically compatible signs or symptoms. The diagnosis of LD should be based on a combination of symptoms, laboratory findings, and patient exposure history.

**Surveillance for Lyme disease**

In North Carolina, health care providers are required to report cases of confirmed or suspected LD to their local health department within 7 days. Laboratories are also required to report positive tests for LD to DPH [1]. Surveillance for LD is based on a national case definition, which establishes uniform criteria for disease reporting in order to monitor trends and take action to reduce disease and improve public health [2]. In 2016, a total of 266 cases of LD were reported in NC (30 confirmed, 236 probable; provisional data). Since 2008, when the probable case classification was introduced, the number of reported confirmed cases of LD has remained relatively constant with an average of 28 cases per year. In contrast, the number of reported probable cases increased more than seven-fold from 2008 to 2016, from 31 to 236 (Fig. 1 & 2).

**High-incidence vs. low-incidence states**

Effective January 2017, the CDC amended the previous definition of exposure criteria from “endemic counties” to “high and low-incidence states”. High-incidence states are defined as those that have had an average of ≥10 confirmed cases of Lyme disease per 100,000 residents over the previous three reporting years [3]. Low-incidence states are defined as states with a disease incidence of <10 confirmed cases per 100,000 residents. Cases of erythema migrans with exposure to tick habitat in a high-incidence state are classified as confirmed. All late manifestations of LD (musculoskeletal, cardiac, and nervous system) and early LD with exposure in a low-incidence state must also be accompanied by appropriate laboratory testing to fulfill the surveillance case definition requirements. Based on the criteria listed above, North Carolina is currently designated as a low-incidence state for surveillance purposes.

**Serologic testing for Lyme disease**

If LD is suspected, two-tiered serological testing is recommended [4,5]. Patients should first be tested by enzyme immunoassay (EIA) or immunofluorescent assay (IFA), and positive and equivocal results should

be confirmed by further testing with the more specific Western blot test. Patients may test negative early in the course of infection, so if LD is highly suspected a convalescent sample should also be tested. For patients who have been ill for more than 4 weeks, IgG will usually be positive by Western blot; an isolated positive IgM in this timeframe is likely a false positive (Fig. 3).

**Erythema migrans (EM) rash in NC**

There are multiple potential causes of EM, including STARI (southern tick-associated rash illness), ringworm, and cellulitis [6]. STARI can occur after the bite of the lone star tick, *Amblyomma americanum*, the most common tick in North Carolina. Lone star ticks are not known vectors for *B. burgdorferi* [7]. The etiologic agent for STARI is unknown and there is no diagnostic test. STARI presents with an EM-like skin lesion which is clinically indistinguishable from the EM rash associated with LD. For surveillance purposes, an EM rash must be accompanied by laboratory evidence of infection to be considered a confirmed case of Lyme disease. Treatment of EM rash should be initiated using the best judgment of the attending clinician.

**Education of patients, prevention of disease**:

We encourage all clinicians to educate their patients about personal protective measures to minimize their risk of acquiring tickborne illness. Lyme disease prevention materials are available from the CDC [8]. Please visit our website (http://epi.publichealth.nc.gov/cd/diseases/ticks.html) or contact the epidemiologist on call at 919-733-3419 with any questions regarding surveillance of Lyme disease.

**Figures 1 & 2: Reported Cases of Lyme Disease in North Carolina, 2011–2016***

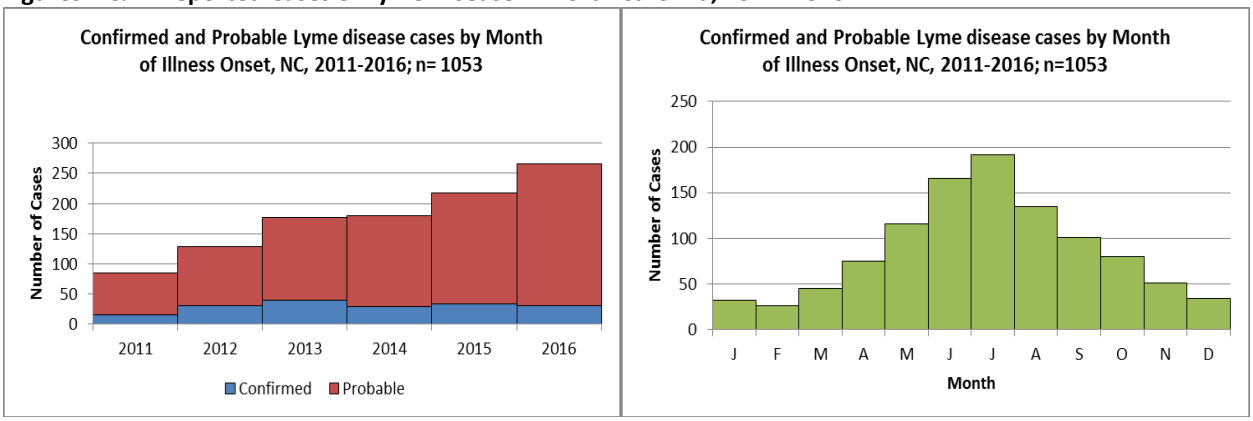



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**Figure 3:**